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(54) **MATRIX RESIN FOR MOLDING MATERIAL AND MOLDING MATERIAL COMPRISING THE SAME**

(57) Abstract:

**PURPOSE:** To obtain the subject resin composition excellent in heat resistance, electrical characteristics, flexibility and toughness by melt kneading a melamine formaldehyde resin prepolymer with PVA having a specified saponification degree.

**CONSTITUTION:** The objective resin is obtained by melt kneading (A) a melamine formaldehyde resin prepolymer

with (B) PVA having  $\leq 75\%$  saponification degree as a thermoplastic resin so as to provide preferably 5-50wt.% blending ratio of the component (B) based on the total amount of the components (A) and (B). Furthermore, vinyl acetate-PVA copolymer having  $\leq 150^\circ\text{C}$  melting point or softening point is preferably used as the component (B). The temperature range of the melt kneading may be a temperature at which the component (B) is melted without gelatinizing the component (A).

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WPI / DERWENT

AN - 1994-230736 [28]

AP - JP19920320523 19921130

PR - JP19920320523 19921130

TI - Matrix resin for moulding material - obtd. by mixing melamine formaldehyde resin prepolymer and PVA thermoplastic resin

IW - MATRIX RESIN MOULD MATERIAL OBTAIN MIX MELAMINE FORMALDEHYDE RESIN PREPOLYMER PVA THERMOPLASTIC RESIN

PA - (MATW ) MATSUSHITA ELECTRIC WORKS LTD

PN - JP6166799 A 19940614 DW199428 C08L61/28 004pp

IC - C08L29/04 ; C08L61/28

AB - J06166799 Matrix resin is obtd. by melt mixing melamine formaldehyde resin prepolymer and thermoplastic resin, where the thermoplastic resin is polyvinyl-alcohol having up to 75% of saponification degree.

- USE/ADVANTAGE - The matrix resin is used for preparing parts of electric appliance, machine etc. By melt mixing specific polyvinyl-alcohol, the matrix resin has improved flexibility and toughness.
- In an example, matrix resin was obtd. by compounding, in gram, 'Matsushita CP9012' (RTM: melamine formaldehyde prepolymer) 420, 'Kuraray LM10HD' (RTM: partially saponified polyvinyl alcohol, saponification degree = 40%) 280, glass fibre (1 mm. length, 10 micron dia.) 300, aminosilane coupling agent 1.8, zinc stearate 10 and citric acid as catalyst 3. (Dwg.0/0)

CLAIMS

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## [Claim(s)]

[Claim 1] Matrix resin for molding materials characterized by thermoplastics being polyvinyl alcohol of 75% or less of rates of saponification to a melamine-formaldehyde-resin prepolymer in matrix resin for molding materials with which it comes to carry out melting kneading of the thermoplastics.

[Claim 2] Matrix resin for molding materials according to claim 1 whose compounding ratio of polyvinyl alcohol is 5 - 50 % of the weight to the total quantity of a melamine-formaldehyde-resin prepolymer and polyvinyl alcohol.

[Claim 3] Matrix resin for molding materials according to claim 1 or 2 whose polyvinyl alcohol is an acetic-acid vinyl-poly vinyl alcohol copolymer.

[Claim 4] A molding material which contains matrix resin for molding materials of a publication in either to claims 1-3.

DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the molding material containing the matrix resin for molding materials and this matrix resin for manufacturing an electrical part, a machine part, etc.

[0002]

[Description of the Prior Art] The thermosetting amino resin represented by melamine-formaldehyde resin, formaldehyde resin, etc. as matrix resin for molding materials for manufacturing mold goods, such as an electrical part and a machine part, conventionally is used. Although it has the features that the mold goods obtained using these thermosetting amino resin are excellent in electrical properties, such as thermal resistance, and arc resistance, tracking resistance, etc., flexibility and toughness, such as impact strength, insertion-proof crack nature, and snap in nature, have a scarce defect. Then, as a means to conquer this defect, this invention person etc. developed the matrix resin for molding materials with which it comes to carry out melting kneading of the thermoplastics to a thermosetting amino resin prepolymer, and performed patent application as Japanese Patent Application No. No. 9528 [ four to ].

[0003]

[Problem(s) to be Solved by the Invention] However, in the matrix resin for molding materials which performed patent application as above-mentioned Japanese Patent Application No. No. 9528 [ four to ], when polyvinyl alcohol was used as thermoplastics, depending on the class of polyvinyl alcohol, there was a problem that there may be few improvement effects of flexibility and toughness.

[0004] It is in offering the molding material containing the matrix resin for molding materials which this invention was made in view of the above-mentioned situation, and was excellent in flexibility and toughness while the purpose of this invention was excellent in a header, thermal resistance, an electrical property, etc. to the melamine-formaldehyde-resin prepolymer in the method of raising the flexibility of the matrix resin for molding materials with which it comes to carry out melting kneading of the polyvinyl alcohol, and toughness, and this matrix resin.

[0005]

[Means for Solving the Problem] This invention is a molding material which contains matrix resin for molding materials characterized by thermoplastics being polyvinyl alcohol of 75% or less of rates of saponification, and this matrix resin for molding materials to a melamine-formaldehyde-resin prepolymer in matrix resin for molding materials with which it comes to carry out melting kneading of the thermoplastics.

[0006] When this invention person etc. did melting kneading with a melamine-formaldehyde-resin prepolymer, he thought that it was probably effective in that compatibility with a melamine-formaldehyde-resin prepolymer uses good polyvinyl alcohol raising the flexibility of a cast and toughness which are acquired, and advanced research paying attention to a rate of saponification of polyvinyl alcohol. Consequently, it results [ that the flexibility of a cast and toughness which are acquired can be raised, and ] in a header and this invention by using polyvinyl alcohol of 75% or less of rates of saponification.

[0007] Moreover, in order to utilize effectively matrix resin for molding materials concerning this invention for a use of a molding material, it is indispensable at the time of melting kneading and molding that matrix resin has a fluidity. For that, what has the melting point or softening temperature in a low temperature requirement which is the degree which said melamine-

formaldehyde-resin prepolymer does not gel as polyvinyl alcohol used by this invention is desirable, 200 degrees C or less are desirable as a concrete numeric value of that melting point or softening temperature, and 150 degrees C or less are more desirable.

[0008] As a compounding ratio of polyvinyl alcohol, although especially limitation is not carried out, it is desirable that it is 5 - 50 % of the weight to the total quantity of a melamine-formaldehyde-resin prepolymer and polyvinyl alcohol. When the flexibility of matrix resin and toughness become inadequate when a compounding ratio of polyvinyl alcohol is less than 5 % of the weight, and said compounding ratio exceeds 50 % of the weight, it is because the thermal resistance of matrix resin, an electrical property, etc. become inadequate.

[0009] Although especially the chemical structure of polyvinyl alcohol used by this invention is not limited, it is desirable to use an acetic-acid vinyl-poly vinyl alcohol copolymer in respect of the ease of carrying out of acquisition.

[0010] Moreover, polyvinyl alcohol used by this invention may use only one sort, and may use two or more sorts together.

[0011] Especially limitation does not have a melamine-formaldehyde-resin prepolymer used by this invention, it may be a solid thing, or may be a syrup-like thing, and only one sort may be used for it, and it may use two or more sorts together.

[0012] What is necessary is not to carry out especially limitation, for example, just to perform it using equipments, such as a roll and a kneader, as a method of carrying out melting kneading of a melamine-formaldehyde-resin prepolymer and polyvinyl alcohol of this invention. Moreover, polyvinyl alcohol fuses about a temperature requirement of melting kneading, and it bends [ a melamine-formaldehyde-resin prepolymer does not gel, and ], and it is not limited especially that what is necessary is just a degree.

[0013] It is important for a molding material concerning this invention that it is a thing containing matrix resin stated above. In addition to the aforementioned matrix resin, this molding material may contain fillers which are contained in the conventional molding material, such as a glass fiber and pulp, and may contain release agents, pigments, etc., such as zinc stearate, further if needed. Moreover, when a glass fiber is included as a filler, coupling agents, such as an amino silane system, may be included. Moreover, what is necessary is for there to be especially no limitation, for example, just to perform it by methods, such as direct pressure shaping and transfer molding, as the shaping method when fabricating using a molding material concerning this invention.

[0014]

[Function] Carrying out melting kneading of the polyvinyl alcohol of 75% or less of rates of saponification raises the flexibility of matrix resin, and toughness to a melamine-formaldehyde-resin prepolymer. And doing in this way does not spoil outstanding thermal resistance, an outstanding electrical property, etc. originating in a melamine-formaldehyde-resin prepolymer.

[0015]

[Example] Hereafter, this invention is explained based on an example. Of course, this invention is not limited to the following example.

(Examples 1-5 and examples 1-2 of a comparison) The class and amount of raw material (a melamine-formaldehyde-resin prepolymer, polyvinyl alcohol, a filler, an amino silane system coupling agent, a release agent, and acid catalyst) which are shown in the after-mentioned table 1 were put into the fine-particles mixer, pre mixing was performed for 10 minutes, and the compound was obtained.

[0016]

[A table 1]

原材料	実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	比較例 1	比較例 2
メラミンホルムアルデヒド樹脂 プレポリマー (g)	420	420	420	560	630	700	420
ポリビニールアルコール 1 (g)	280	—	—	140	70	—	—
ポリビニールアルコール 2 (g)	—	280	—	—	—	—	—
ポリビニールアルコール 3 (g)	—	—	280	—	—	—	—
ポリビニールアルコール 4 (g)	—	—	—	—	—	—	280
充填材 (ガラス短繊維) (g)	300	300	300	300	300	300	300
カップリング剤 (g)	1.8	1.8	1.8	1.8	1.8	1.8	1.8
離型剤 (g)	10	10	10	10	10	10	10
酸触媒 (g)	3	3	3	3	3	3	3

[0017] In addition, the following were used as each raw material shown in said table 1. As a melamine-formaldehyde-resin prepolymer, it is the solid melamine resin (lot number CP 9012) by Matsushita Electric Works, Ltd. as polyvinyl alcohol 1. The acetic-acid vinyl-poly vinyl alcohol copolymer [the Kuraray Co., Ltd. make, lot number LM10HD; and partial saponification poval] of \*\* and 40% of rates of saponification (mol %) as polyvinyl alcohol 2 The acetic-acid vinyl-poly vinyl alcohol copolymer [the Unitika, Ltd. make, lot number UMR-20L, and partial saponification poval] of 35% of rates of saponification (mol %) as polyvinyl alcohol 3 The acetic-acid vinyl-poly vinyl alcohol copolymer [the Kuraray Co., Ltd. make, a lot number L-7, and partial saponification poval] of 70% of rates of saponification (mol %) as polyvinyl alcohol 4 Acetic-acid vinyl [ of 83% of rates of saponification (mol %) ]-poly vinyl alcohol copolymer [Kuraray Co., Ltd. make, a lot number L-188 and partial saponification poval] — as a filler — a glass single fiber (L= 1mm and D= 10 micrometers). — as a coupling agent, zinc stearate was used as a release agent and the citric acid was used for the silane coupling agent of an amino silane system as an acid catalyst, respectively.

[0018] After carrying out melting kneading of the obtained compound for 10 minutes at 110 degrees C with a biaxial roll (30cmphi), the kneading object of the shape of an acquired sheet was ground, and the molding material was obtained. Mold goods (test piece) were obtained for the obtained molding material with 37t press briquetting machine of direct pressure on the die temperature of 160 degrees C, the pressure of 60kg/cm<sup>2</sup>, and the conditions for cycle time 4 minutes.

[0019] The evaluation trial was performed [ mold goods / (test piece) / which were obtained in the above examples 1-5 and examples 1-2 of a comparison ] about flexibility and toughness (a \*\*\*\* pace of expansion, a bending elastic modulus, flexural strength, Charpy impact value), an electrical property (arc resistance, tracking resistance), and pewter thermal resistance. The result is shown in a table 2.

[0020] In addition, the flexibility in a table 2 and toughness, and the test method of electrical property \*\*\*\*\* were performed by the method based on JIS-K6911. Moreover, about pewter thermal resistance, mold goods (test piece) were immersed for 30 seconds into the 260-degree C pewter, and x estimated that which is O and was abnormal in some which do not have abnormalities in appearance.

(Example 3 of a comparison) The glass staple fiber (L= 1mm, D= 10 micrometers) was contained 30% of the weight as a molding material, and mold goods (test piece) were obtained

with the screw inline-type injection molding machine using the molding material which uses polybutyrene terephthalate resin as matrix resin on the cylinder temperature of 240 degrees C, the die temperature of 65 degrees C, the injection pressure of 1000kg/cm<sup>2</sup>, and the conditions for molding time amount 30 seconds. Subsequently, by the same method as an example, the evaluation trial of mold goods is shown in \*\*\*\*\*, and the result is shown in a table 2.

[0021]

[A table 2]

[0022] Although the cast obtained in the examples 1-5 was equivalent about an electrical property and pewter thermal resistance compared with the cast of the example 1 of a comparison acquired using the conventional melamine resin molding material, surpassing in respect of flexibility and toughness was checked so that it might see to a table 2. Moreover, when examples 1-3 were compared with the example 2 of a comparison, it was checked that the direction of the examples 1-3 for which the rate of saponification is using 75% or less of polyvinyl alcohol surpasses in respect of flexibility and toughness.

[0023]

[Effect of the Invention] Since the matrix resin for molding materials concerning this invention has composition containing polyvinyl alcohol \*\* of 75% or less of rates of saponification, the mold goods obtained using this matrix resin for molding materials become what was excellent also in flexibility and toughness with thermal resistance and an electrical property. Therefore, the molding material containing this matrix resin for molding materials concerning this invention is very useful as a material for manufacturing an electrical part and a machine part.

#### TECHNICAL FIELD

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[Industrial Application] This invention relates to the molding material containing the matrix resin for molding materials and this matrix resin for manufacturing an electrical part, a machine part, etc.

## PRIOR ART

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[Description of the Prior Art] The thermosetting amino resin represented by melamine-formaldehyde resin, formaldehyde resin, etc. as matrix resin for molding materials for manufacturing mold goods, such as an electrical part and a machine part, conventionally is used. Although it has the features that the mold goods obtained using these thermosetting amino resin are excellent in electrical properties, such as thermal resistance, and arc resistance, tracking resistance, etc., flexibility and toughness, such as impact strength, insertion-proof crack nature, and snap in nature, have a scarce defect. Then, as a means to conquer this defect, this invention person etc. developed the matrix resin for molding materials with which it comes to carry out melting kneading of the thermoplastics to a thermosetting amino resin prepolymer, and performed patent application as Japanese Patent Application No. No. 9528 [ four to ].

## EFFECT OF THE INVENTION

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[Effect of the Invention] Since the matrix resin for molding materials concerning this invention has composition containing polyvinyl alcohol \*\* of 75% or less of rates of saponification, the mold goods obtained using this matrix resin for molding materials become what was excellent also in flexibility and toughness with thermal resistance and an electrical property. Therefore, the molding material containing this matrix resin for molding materials concerning this invention is very useful as a material for manufacturing an electrical part and a machine part.

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, in the matrix resin for molding materials which performed patent application as above-mentioned Japanese Patent Application No. No. 9528 [ four to ], when polyvinyl alcohol was used as thermoplastics, depending on the class of polyvinyl alcohol, there was a problem that there may be few improvement effects of flexibility and toughness.

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[0005]

## MEANS

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[Means for Solving the Problem] This invention is a molding material which contains matrix resin for molding materials characterized by thermoplastics being polyvinyl alcohol of 75% or less of rates of saponification, and this matrix resin for molding materials to a melamine-formaldehyde-resin prepolymer in matrix resin for molding materials with which it comes to carry out melting kneading of the thermoplastics.

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[0007] Moreover, in order to utilize effectively matrix resin for molding materials concerning this invention for a use of a molding material, it is indispensable at the time of melting kneading and molding that matrix resin has a fluidity. For that, what has the melting point or softening temperature in a low temperature requirement which is the degree which said melamine-formaldehyde-resin prepolymer does not gel as polyvinyl alcohol used by this invention is desirable, 200 degrees C or less are desirable as a concrete numeric value of that melting point or softening temperature, and 150 degrees C or less are more desirable.

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toughness become inadequate when a compounding ratio of polyvinyl alcohol is less than 5 % of the weight, and said compounding ratio exceeds 50 % of the weight, it is because the thermal resistance of matrix resin, an electrical property, etc. become inadequate.

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## OPERATION

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[Function] Carrying out melting kneading of the polyvinyl alcohol of 75% or less of rates of saponification raises the flexibility of matrix resin, and toughness to a melamine-formaldehyde-resin prepolymer. And doing in this way does not spoil outstanding thermal resistance, an outstanding electrical property, etc. originating in a melamine-formaldehyde-resin prepolymer.

## EXAMPLE

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[Example] Hereafter, this invention is explained based on an example. Of course, this invention is not limited to the following example.

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[0016]

[A table 1]



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[0021]

[A table 2]

[0022] Although the cast obtained in the examples 1-5 was equivalent about an electrical property and pewter thermal resistance compared with the cast of the example 1 of a comparison acquired using the conventional melamine resin molding material, surpassing in respect of flexibility and toughness was checked so that it might see to a table 2. Moreover, when examples 1-3 were compared with the example 2 of a comparison, it was checked that the direction of the examples 1-3 for which the rate of saponification is using 75% or less of polyvinyl alcohol surpasses in respect of flexibility and toughness.

[0023]

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(12) 公開特許公報(A)

(11)特許出願公開番号

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審査請求 未請求 請求項の数4(全4頁)

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		(74)代理人	弁理士 川原 幹夫 (外1名)

(54)【発明の名称】 成形材料用マトリックス樹脂及びそれを含む成形材料

(57)【要約】

【目的】 メラミンホルムアルデヒド樹脂プレポリマーに対し、ポリビニルアルコールが溶融混練されてなる成形材料用マトリックス樹脂の可塑性及び弾性を向上させる。耐熱性、電気特性等に優れるとともに、可塑性と弾性に優れた、成形材料用マトリックス樹脂及びこのマトリックス樹脂を含む成形材料を提供する。

【構成】 メラミンホルムアルデヒド樹脂プレポリマーに対し、熱可塑性樹脂が溶融混練されてなる成形材料用マトリックス樹脂において、熱可塑性樹脂がけん化率75%以下のポリビニルアルコールであることを特徴とする成形材料用マトリックス樹脂及びこの成形材料用マトリックス樹脂を含む成形材料。

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特開平6-166799

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## 【特許請求の範囲】

【請求項1】 メラミンホルムアルデヒド樹脂プレポリマーに対し、熱可塑性樹脂が溶融混練されてなる成形材料用マトリックス樹脂において、熱可塑性樹脂がけん化率75%以下のポリビニルアルコールであることを特徴とする成形材料用マトリックス樹脂。

【請求項2】 ポリビニルアルコールの配合比が、メラミンホルムアルデヒド樹脂プレポリマーとポリビニルアルコールの合計量に対して、5～50重量%である請求項1記載の成形材料用マトリックス樹脂。

【請求項3】 ポリビニルアルコールが酢酸ビニル-ポリビニルアルコール共重合体である請求項1または2記載の成形材料用マトリックス樹脂。

【請求項4】 請求項1から3までのいずれかに記載の成形材料用マトリックス樹脂を含む成形材料。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、電気部品や機械部品等を製造するための成形材料用マトリックス樹脂及びこのマトリックス樹脂を含む成形材料に関する。

【0002】

【従来の技術】 従来、電気部品や機械部品等の成形品を製造するための成形材料用マトリックス樹脂としてはメラミン-ホルムアルデヒド樹脂や尿素-ホルムアルデヒド樹脂等に代表される熱硬化性アミノ樹脂が用いられている。これらの熱硬化性アミノ樹脂を用いて得られる成形品は耐熱性や、耐アーク性、耐トラッキング性等の電気特性等が優れているという長を有しているが、衝撃強度、耐インサートクラック性、スナップイン性等の可撓性及び韌性に乏しい欠点がある。そこで、本発明者等はこの欠点を克服する手段として、熱硬化性アミノ樹脂プレポリマーに対し、熱可塑性樹脂が溶融混練されてなる成形材料用マトリックス樹脂を開発し、特願平4-9528号として特許出願を行った。

【0003】

【発明が解決しようとする課題】 ところが、上記の特願平4-9528号として特許出願を行った成形材料用マトリックス樹脂では、熱可塑性樹脂としてポリビニルアルコールを使用した場合、ポリビニルアルコールの種類によっては可撓性及び韌性の向上効果が少ない場合があるという問題があった。

【0004】 本発明は上記の事情に鑑みてなされたものであり、本発明の目的はメラミンホルムアルデヒド樹脂プレポリマーに対し、ポリビニルアルコールが溶融混練されてなる成形材料用マトリックス樹脂の可撓性及び韌性を向上させる方法を見出し、耐熱性、電気特性等に優れるとともに、可撓性及び韌性に優れた、成形材料用マトリックス樹脂及びこのマトリックス樹脂を含む成形材料を提供することにある。

【0005】

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【課題を解決するための手段】 本発明はメラミンホルムアルデヒド樹脂プレポリマーに対し、熱可塑性樹脂が溶融混練されてなる成形材料用マトリックス樹脂において、熱可塑性樹脂がけん化率75%以下のポリビニルアルコールであることを特徴とする成形材料用マトリックス樹脂及びこの成形材料用マトリックス樹脂を含む成形材料である。

【0006】 本発明者等はメラミンホルムアルデヒド樹脂プレポリマーと溶融混練した際に、メラミンホルムアルデヒド樹脂プレポリマーとの相溶性が良好なポリビニルアルコールを使用することが、得られる成型品の可撓性及び韌性を向上させるのに有効であろうと考え、ポリビニルアルコールのけん化率に注目し研究を進めた。その結果、けん化率75%以下のポリビニルアルコールを使用することにより、得られる成型品の可撓性及び韌性を向上させることができることを見出し、本発明に到ったものである。

【0007】 また、本発明に係る成形材料用マトリックス樹脂を成形材料の用途で有効に活用するためには、溶融混練時および成型時に、マトリックス樹脂が流動性を有することが不可欠である。このためには、この発明で用いられるポリビニルアルコールとしては、前記メラミンホルムアルデヒド樹脂プレポリマーがゲル化しない程度の低い温度範囲に、融点もしくは軟化点を有するものが好ましく、その融点もしくは軟化点の具体的な数値としては200℃以下が好ましく、150℃以下がより好ましい。

【0008】 ポリビニルアルコールの配合比としては、特に限定はされないが、メラミンホルムアルデヒド樹脂プレポリマーとポリビニルアルコールの合計量に対して、5～50重量%であることが好ましい。ポリビニルアルコールの配合比が5重量%未満の場合は、マトリックス樹脂の可撓性及び韌性が不十分になり、また、前記配合比が50重量%を超える場合は、マトリックス樹脂の耐熱性、電気特性等が不十分になるからである。

【0009】 本発明で使用するポリビニルアルコールの化学構造は特に限定されないが、酢酸ビニル-ポリビニルアルコール共重合体を使用することが、入手のしやすさの点で好ましい。

【0010】 また、本発明で使用するポリビニルアルコールは1種のみを用いてもよいし、複数を併用してもよい。

【0011】 本発明で使用するメラミンホルムアルデヒド樹脂プレポリマーは、特に限定はなく、固形状のものであってもシラップ状のものであってもよく、また、1種のみを用いてもよいし、複数を併用してもよい。

【0012】 本発明のメラミンホルムアルデヒド樹脂プレポリマーとポリビニルアルコールを溶融混練する方法としては、特に限定はされず、例えばローラやニーダー等の装置を用いて行えばよい。また、溶融混練の温度範

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図についてはポリビニルアルコールが溶融し、かつ、メラミンホルムアルデヒド樹脂プレポリマーがゲル化しない程度であればよく、特に限定されない。

【0013】本発明に係る成形材料は、以上に述べたマトリックス樹脂を含むものであることが重要である。この成形材料は前記のマトリックス樹脂に加えて、従来の成形材料に含まれているようなガラス繊維、パルプ等の充填材を含んでいてもよく、必要に応じ、ステアリン酸亜鉛等の離型剤や顔料等をさらに含んでいてもよい。また、充填材としてガラス繊維を含む場合は、アミノシラン系等のカップリング剤を含んでいてもよい。また、本発明に係る成形材料を用いて成形する時の成形方法としては、特に限定はなく、例えば直圧成形、トランスファー成形等の方法で行えばよい。

【0014】

【作用】メラミンホルムアルデヒド樹脂プレポリマーに\*

\*対し、けん化率75%以下のポリビニルアルコールを溶融混練することは、マトリックス樹脂の可塑性及び靱性を向上させる。しかも、このようにすることは、メラミンホルムアルデヒド樹脂プレポリマーに由来する優れた耐熱性、電気特性等を損なわない。

【0015】

【実施例】以下、本発明を実施例に基づき説明する。勿論、本発明は下記の実施例に限定されるものではない。

(実施例1～5及び比較例1～2)後記表1に示す原材料(メラミンホルムアルデヒド樹脂プレポリマー、ポリビニルアルコール、充填材、アミノシラン系カップリング剤、離型剤及び酸触媒)の種類と量を粉体ミキサーに入れ、10分間ブレミキシングを行って、配合物を得た。

【0016】

【表1】

原材料	実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	比較例 1	比較例 2
メラミンホルムアルデヒド樹脂 プレポリマー (g)	420	420	420	560	630	700	420
ポリビニルアルコール1 (g)	280	-	-	140	70	-	-
ポリビニルアルコール2 (g)	-	280	-	-	-	-	-
ポリビニルアルコール3 (g)	-	-	280	-	-	-	-
ポリビニルアルコール4 (g)	-	-	-	-	-	-	280
充填材(ガラス短繊維)(g)	300	300	300	300	300	300	300
カップリング剤 (g)	1.8	1.8	1.8	1.8	1.8	1.8	1.8
離型剤 (g)	10	10	10	10	10	10	10
酸触媒 (g)	3	3	3	3	3	3	3

【0017】なお、前記表1に示した各原材料としては、次のものを使用した。メラミンホルムアルデヒド樹脂プレポリマーとしては松下電工社製の固形メラミン樹脂(品番CP9012)を、ポリビニルアルコール1としては、けん化率40%(モル%)の酢酸ビニル-ポリビニルアルコール共重合体【クラレ社製、品番LM10HD、部分けん化ポパール】を、ポリビニルアルコール2としては、けん化率35%(モル%)の酢酸ビニル-ポリビニルアルコール共重合体【ユニチカ社製、品番UMR-20L、部分けん化ポパール】を、ポリビニルアルコール3としては、けん化率70%(モル

40%)の酢酸ビニル-ポリビニルアルコール共重合体【クラレ社製、品番L-7、部分けん化ポパール】を、ポリビニルアルコール4としては、けん化率83%(モル%)の酢酸ビニル-ポリビニルアルコール共重合体【クラレ社製、品番L-188、部分けん化ポパール】を、充填材としては $L=1\text{mm}$ 、 $D=10\mu\text{m}$ のガラス短繊維を、カップリング剤としてはアミノシラン系のシランカップリング剤を、離型剤としてはステアリン酸亜鉛を、酸触媒としてはクエン酸をそれぞれ使用した。

【0018】得られた配合物を2軸ロール(30cm

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め)により、110℃で10分間溶融混練した後、得られたシート状の混練物を粉碎して成形材料を得た。得られた成形材料を直圧37tプレス成型機により金型温度160℃、圧力60kg/cm<sup>2</sup>、成型時間4分の条件で成形品(テストピース)を得た。

【0019】以上の実施例1～5及び比較例1～2で得られた成形品(テストピース)について、可撓性及び靱性(引張伸び率、曲げ弾性率、曲げ強度、シャルピー衝撃値)と電気特性(耐アーク性、耐トラッキング性)とハンダ耐熱性について評価試験を行った。その結果を表2に示す。

【0020】なお、表2中の可撓性及び靱性と電気特性についての試験方法はJIS-K6911に準拠した方法で行った。また、ハンダ耐熱性については成形品(テスト

\*トピース)を260℃のハンダ中に30秒間浸漬し、外観に異常がないものを○で、異常があったものを×で評価した。

(比較例3)成形材料としてガラス短繊維(L=1mm、D=10μm)を30重量%含有し、ポリブチレンテレフタレート樹脂をマトリックス樹脂とする成形材料を用い、スクリーインライン型射出成型機により、シリンダー温度240℃、金型温度65℃、射出圧力1000kg/cm<sup>2</sup>、成型時間30秒の条件で成形品(テストピース)を得た。ついで実施例と同様の方法で成形品の評価試験を行い、その結果を表2に示す。

【0021】

【表2】

		実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	比較例 1	比較例 2	比較例 3
可 撓 性 及 び 靱 性	引張伸び率 (%)	2.7	2.9	2.3	2.5	2.1	0.7	1.0	3.1
	曲げ弾性率 (kgf/mm <sup>2</sup> )	730	710	750	810	850	760	460	920
	曲げ強度 (kgf/mm <sup>2</sup> )	11.9	11.0	12.4	13.7	15.2	12.1	7.8	13.1
	シャルピー 衝撃値 (kgfcm/ cm <sup>2</sup> )	6.8	7.3	5.5	8.1	5.8	2.3	2.5	5.1
電 気 特 性	耐アーク性 (秒)	120	120	120	120	120	120	120	75
	耐トラッキ ング性(V)	600	600	600	600	600	600	600	450
ハンダ耐熱性		○	○	○	○	○	○	○	×

【0022】表2にみるように、実施例1～5で得られた成形品は、従来のメラミン樹脂成形材料を用いて得られた比較例1の成形品に比べて電気特性及びハンダ耐熱性については同等であるが、可撓性及び靱性の点で優れていることが確認された。また、実施例1～3と比較例2を比べると、けん化率が75%以下のポリビニルアルコールを使用している実施例1～3の方が可撓性及び靱性の点で優れていることが確認された。

【0023】

【発明の効果】本発明に係る成形材料用マトリックス樹脂はけん化率75%以下のポリビニルアルコールを含む構成となっているので、この成形材料用マトリックス樹脂を用いて得られる成形品は耐熱性、電気特性と共に可撓性及び靱性にも優れたものとなる。そのため、この成形材料用マトリックス樹脂を含む、本発明に係る成形材料は、電気部品や機械部品を製造するための材料として非常に有用なものである。

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